



Federal Laboratories
for
Health Canada
and
Agriculture and Agri-Food Canada



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**Federal Laboratories for Health Canada and
Agriculture and Agri-Food Canada**

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Safeguarding the health of Canada's human and animal populations is the driving force behind building the new Federal Laboratories for Agriculture and Agri-Food Canada and Health Canada in Winnipeg, Manitoba. The \$142-million facility replaces existing, outdated facilities operated by the two departments in Canada's National Capital Region.

When completed in 1997, this testing, research and training complex will be one of the most advanced facilities of its kind in the world. It is the first to combine under one roof laboratories concerned with both human and animal diseases. Its key roles include:

- diagnosing human and animal diseases
- developing new diagnostic methods
- responding to acute outbreaks of diseases across Canada
- training federal and provincial scientists and health officials
- evaluating methods for controlling and eradicating diseases

Equipped with state-of-the-art technology and diagnostic equipment, the facility is designed to provide maximum biological security and containment. By employing the most modern and strictest containment and safety procedures, the operations of the laboratories pose no health threat to the neighbouring community or local livestock.

The six-storey building is being built on a 14.8-acre site in downtown Winnipeg, next to a major hospital and Health Sciences Centre that also houses the University of Manitoba's Faculty of Medicine.

When completed, the 29,300 square metre complex will consist of level 2, 3 and 4 bio-containment laboratories, offices, training rooms, a cafeteria, library, parking lot for 220 cars and other common support areas.

Of about 200 full-time staff, some 120 will work for Health Canada's Bureau of Microbiology; 40 in Agriculture and Agri-Food Canada's National Centre for Diagnostic Virology and 40 in operational support.

About 650 direct jobs and another 1,100 indirect jobs are being created in the Winnipeg area as a result of this project.



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Through its laboratory expertise, Health Canada's Bureau of Microbiology contributes significantly to the understanding and control of human disease in Canada. As part of the Laboratory Centre for Disease Control (the national organization responsible for the identification, investigation, control and prevention of disease in Canada), the Bureau plays an important role in Canada's public health intelligence system.

The Bureau of Microbiology is comprised of six national laboratories which focus on Immunology, Sexually Transmitted Diseases, Enteric Pathogens, Bacteriology, Special Pathogens and Viral Oncology. These six laboratories will operate from the new Winnipeg facility. In collaboration with provincial laboratories, the Bureau also operates nine national centres across the country; each of these centres deals with a specialized area of microbiology including Parasitology (morphology), Streptococcus, Mycology, Yersinia, Rabies, Parasitology (serology), Enterovirology, Epstein-Barr Virus and Treponema Pallidum Immobilization.

The work focuses on several key areas, including: developing advanced diagnostic technologies, providing highly specialized diagnostic services, laboratory disease surveillance, disease outbreak investigations and both national and international laboratory proficiency testing.

Developing new diagnostic technologies to improve accuracy, reliability and safety in detecting and diagnosing diseases is an important component. Working regularly in collaboration with other laboratories, universities or industry, the Bureau develops testing methods which can be used by laboratories across Canada. These refined tests improve the speed and accuracy of laboratory test results and help those involved in patient care to provide more accurate and timely treatment.

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The Bureau also carries out testing which is either too highly specialized or too costly to be performed in numerous individual labs across the country. Provincial or hospital laboratories contact the Bureau when they have unusual organisms which cannot be readily identified. Once these organisms are sent to the Bureau for identification, speed and accuracy are both crucial as the test results are required either by provinces that are managing a disease outbreak or by hospitals which are treating patients.

Ongoing disease surveillance is also carried out. The Bureau compiles data and performs studies not only during an outbreak of disease, but on a continual basis. Understanding and tracking the spread of microbial causes of disease necessitates that national disease databases be maintained and developed. Each laboratory in the Bureau compiles data crucial to the understanding of various disease-causing organisms. Some of the common pathogens and diseases dealt with by the Bureau include: hantaviruses, hepatitis, influenza viruses, meningococcus, E.coli (hamburger disease), salmonella, gonorrhea, chlamydia and papilloma virus.

The Bureau studies uncommon or evolving organisms and those which have adapted and are no longer destroyed by traditional drug treatments. Staff are working to develop an increased understanding of bacteria and viruses which have not previously threatened Canadians but which may become a threat due to, for example, international travel and trade.

A major area of responsibility is a role in providing Canadian national quality assurance programs. Each laboratory runs quality control programs for provincial, hospital and private sector laboratories. It is crucial that all Canadian laboratories remain up-to-date, consistent and

accurate in the face of evolving organisms, newly identified strains and technology development. The quality control testing provides a dual benefit to the Canadian public health system. It ensures that Canadian labs are performing top quality work and that information is shared throughout the country. It helps guarantee the accuracy and security of Canada's national disease surveillance system, as the test results of individual labs are entered into Bureau databases to track, and even anticipate, the occurrence of disease and disease-causing organisms throughout Canada.

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Internationally, quality control and information exchange are also crucial. The Bureau is actively involved in international quality control programs, both performing and undergoing proficiency testing in collaboration with labs around the world. The tuberculosis lab has been designated as the sole World Health Organization Collaborating Centre on TB and has the responsibility to ensure that the techniques and interpretations used in TB testing are of top quality and globally consistent.

Through its Bureau of Microbiology, Health Canada's Laboratory Centre for Disease Control plays a significant role in the identification and control of disease using laboratory methods. Standards are of international quality and are developed through academic liaison, peer reviewed publishing, participation in professional conferences, work with international centres and consultation with other Canadian experts. The Winnipeg Laboratories will facilitate the Bureau's ongoing work and enhance their ability to manage emerging disease issues.

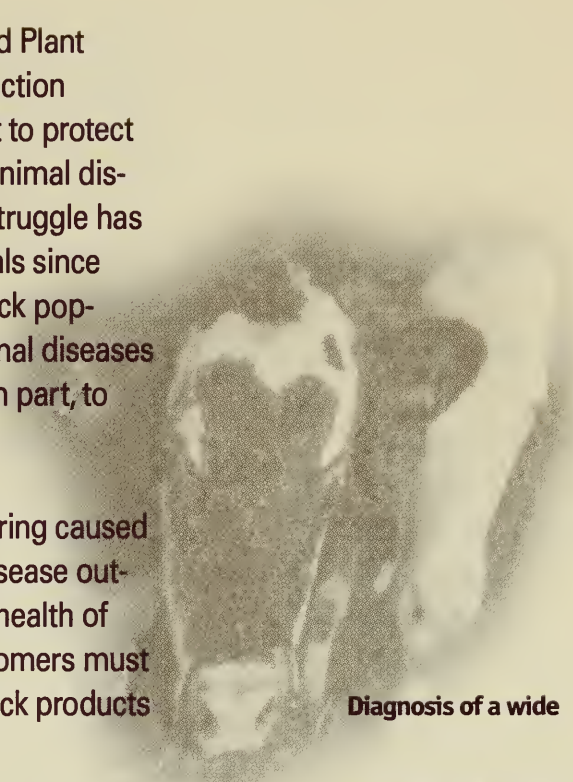
Agriculture and Agri-Food Canada's Animal and Plant Health Directorate (Food Protection and Inspection Branch) plays a key role in the continuing fight to protect Canada's livestock population from a host of animal diseases. This vitally important yet little-known struggle has been waged by Canadian animal health officials since before Confederation. Today, Canada's livestock populations are free from most of the serious animal diseases found in many countries of the world thanks, in part, to these efforts.

Along with protecting livestock from the suffering caused by such diseases, prevention and control of disease outbreaks is of vital importance to the economic health of Canada's agricultural sector. International customers must be assured that Canadian livestock and livestock products are disease-free.

This is the job of the National Centre for Diagnostic Virology that will be relocated at the Federal Laboratories in Winnipeg. Major functions of the Centre include testing samples from animals to be imported into, or exported from, Canada. Diagnosis of a wide variety of livestock diseases caused by viruses constitutes the bulk of testing done at the laboratory.

At the forefront of animal disease control is the Centre's Foreign Animal Disease Unit, focussing on diagnostic testing to identify more than 27 foreign viral diseases that could threaten Canadian livestock. Failure to maintain constant vigilance against such diseases could have catastrophic consequences.

For example, an outbreak of foot and mouth disease, the world's most feared livestock affliction, could quickly lead to severe international trade embargoes by countries free from the disease. An embargo lasting just one and a half



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years could cost Canadian producers more than \$2.5 billion. Though the disease most often cripples rather than kills its victims, all afflicted animals would have to be destroyed to prevent spread of the disease. The last outbreak of foot and mouth disease in Canada in the early 1950s caused some \$800 million in losses. Other than foot and mouth disease, examples of devastating diseases include hog cholera, African swine fever and Newcastle disease.

The Centre employs diagnostic techniques including virus isolation, electron microscopy, ELISA, hemadsorption, immunofluorescence, immunoperoxidase and serum neutralization. Molecular biology has become an increasingly important diagnostic tool. For example, a new diagnostic technique uses a DNA probe to detect pseudorabies viruses.

Research now under way at laboratories in Ottawa, Ontario, involves refining existing diagnostic techniques and developing new detection methods for a variety of animal diseases. Laboratory scientists have recently developed an ELISA technique for diagnosing bluetongue disease in sheep and deer which is now adopted as the international standard.

Laboratory staff also train veterinarians and other animal health officials to recognize and react to disease outbreaks. As well, they conduct a semi-annual exotic diseases course on the management of disease outbreaks and eradication programs.

Employee and community safety is the primary concern for all Federal Laboratories programs. Integral to the design, equipment and operating procedures of the Winnipeg facility are the latest high-tech concepts in safety and security:

- Project engineers and scientists consulted laboratories internationally to find and adapt the world's best safety and security features.
- An international panel of safety experts reviewed the design as it was developed and will be involved in reviewing testing programs.
- Biosafety guidelines and standards developed by Health Canada, the Medical Research Council and Agriculture and Agri-Food Canada were followed.

CONTAINMENT

The complex will include laboratories which meet bio-safety and containment standards for Levels 2, 3 and 4. An independent office of biosafety will monitor all maintenance and program activities to ensure that safety and containment are strictly observed.

The high security areas of the laboratories have been designed with:

- Air tight rooms and ductwork
- Proven techniques of heat sterilization of all solid and liquid wastes
- High Efficiency Particulate Air (HEPA) filtration—99.97% efficiency to .3 microns
- Zoned negative air pressures in the laboratory areas, maintained by air-locks for entry and exit
- Interlocking and airtight bio-seal door and damper systems
- Emergency power back-up to all heating, ventilation and air conditioning systems and essential life safety systems

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- Special containment seals for all mechanical, electrical and structural penetrations through the containment barrier

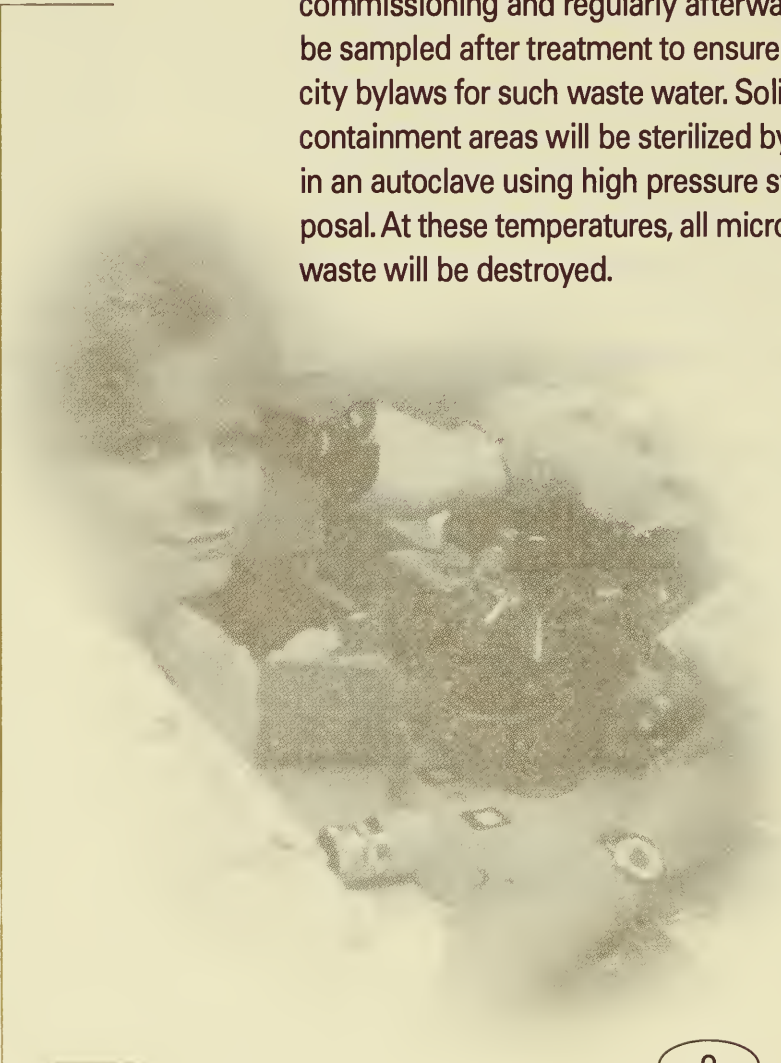
All activity in the high security laboratories will be governed by strict handling and decontamination procedures. Staff working in Level 4 labs will be protected by wearing specially designed, positive pressure, ventilated body suits. Everything will leave this facility sterilized.

Solid wastes from the
containment areas will

be sterilized by
proven techniques.

WASTE DISPOSAL

A biological liquid waste system will completely sterilize all liquid waste from the Level 3 and 4 containment areas by heating it in "pressure cookers" (autoclaves). During commissioning and regularly afterwards, the effluent will be sampled after treatment to ensure that it complies with city bylaws for such waste water. Solid wastes from the containment areas will be sterilized by proven techniques in an autoclave using high pressure steam before disposal. At these temperatures, all micro-organisms in the waste will be destroyed.





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